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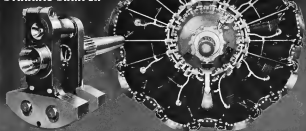
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AVIATION for April, 1935



Donnell
Army
Bomber

Aircraft at Work

There has been a lot of talking about airplanes for business use since 1929, but only a small part of it has been done by the people in the best position to know. Now the owners of business planes have spoken for themselves. What most of them say is that they couldn't get along without their ships, and that if their neighbors and competitors are wise they will step out and buy airplanes of their own. With most of the customers acting as volunteer salesmen, it looks like a good year.

A DISTRIBUTOR of centrifuge machinery finds that with an airplane he can go straight to headquarters and talk to the boss of the company he is trying to sell, where previously he would have limited himself to third hand contact through water representatives in the field. A surgeon, who is also a ranchman, keeps in touch with both jobs by hopping back and forth by plane between the ranch and his practice in a city. For every service a man can imagine, a manufacturer of valves and valves uses his plane to fly distributors and large customers to his plant, where they can see for themselves what they are getting. A Mississippi capitalist uses his personal plane for dropping in for inspection of scattered properties in which he is, or may become, financially interested. The owner of a chain of newspapers find a company airplane indispensable to keep in personal contact with them. The president of a company manufacturing publicly-traded exports relies, partly by the convenient territorial savings that the company airplane has provided and by its advertising value. A South African merchant of dry goods imports an Ansonia airplane to carry a salesman and his cases of supplies to widely scattered outposts. A Czech sugar in Texas sets a plane to bring supplies and machinery to the ranch in emergencies.

operator or his airplane, or airplanes in general and of airplane manufacturers and simultaneously depend largely on how he happened to buy his own ship and how he has been operating it. Surprisingly few of the present owners report themselves as having been told from scratch by deliberate managers. The present majority were converted from within and trace their ownership of a plane to the persistent persistence of their own aviation enthusiasm or their own aspirations.

How many firms that might profitably use airplanes are not using them now simply because so out has drilled into at the initial long enough to overcome the initial inertia and conversion of these officials in a matter of speedweeks, but undoubtedly there are others here.

Unless there is a pilot already in the organization to whom a plane can be assigned, companies purchasing ships have had to decide whether some official would learn or in himself or whether a



When the small fleet of ships is been sold to him, he has the ship ready to fly in the morning.

professional pilot should be hired. Most of these decide on the latter, for of all the company-owned planes of which we have heard, about 50 per cent are flown by pilots hired for the purpose and a majority of the remainder by company officials who already knew how to fly before the plane was acquired. Only a very few contractors have the owner himself

to run his own ship and then let a professional pilot go to take it over for himself.

Where a professional pilot is hired, there is approximately a 20-30 division between the working rates of the company's business and giving him on sales or research or, on the other hand, driving his time exclusively to flying the plane and in maintaining it or in maintenance.

Where a plane is flown only a few hundred hours a year, or in some cases the case, piloting and supervising it is likely to become a full-time job. In the company case where the annual total of flying is from one to two hundred hours the pilot clearly might be have some other place in the company, possibly if the business has any, into activities particularly closely connected with the use of the plane. A considerable proportion of owners who have wanted a pilot must expect that they thought they could readily dealing with their own marks and him as the same type thought a difficult to give piloting will also work have a local airport operator or flying instructor on a retainer here and are aware of being able to call on him whenever a trip is to be made. The small group of owners that have had full-time pilots who do nothing except fly a plane and apparently don't do much of that contribute much more than is shown in the diversified group who probably or certainly would not be aware if they didn't have their present ship.

The suggestion that they have no other use for these planes is certainly small for although the theory that aviation is a hazardous and hazardous enterprise has been abandoned in all but the super-sensitized, the belief that it must be extremely costly persists. Of intelligent business men with a good knowledge of what goes on, but with no special acquaintance with aviation, certainly a very small minority realize that a few passenger airplanes will take them far to go on a pilot of gas as well as a high-speed machine and lower cost, remember that a plane and its engine will go naturally better without any major attention or adjustment than our car ought to be expected to. Over-



These are some people that to see his plane in an actual month of working money.

merchandise for the factory. Every business man that you talk to will tell you in the abstract that he is in favor of buying anything that will pay for itself, whether through lowering production cost, increasing the product, or strengthening the sales force. It is possible, though, that some of these men will be sufficiently astute to discover a hazardous and for itself and to go out and investigate on an even account the possibility of applying it usefully. The other majority will want to be persuaded or at least to be furnished with facts and figures. The typical figure for the average businessman usually isn't much disposed to act on his own or the trouble-free analysis of the economics of raw equipment. He much prefer to have someone else hand him the facts, all properly and illustrated.

The percentage of those who will look for aviation of their own account with one some personal should be particularly small for although the theory that aviation is a hazardous and hazardous enterprise has been abandoned in all but the super-sensitized, the belief that it must be extremely costly persists. Of intelligent business men with a good knowledge of what goes on, but with no special acquaintance with aviation, certainly a very small minority realize that a few passenger airplanes will take them far to go on a pilot of gas as well as a high-speed machine and lower cost, remember that a plane and its engine will go naturally better without any major attention or adjustment than our car ought to be expected to. Over-

most owner among these business men who fly themselves, assume that he can't fly a plane as an actual means of saving money on long trips with one or more companions, and some of them are not even enough to have their own aircraft now at having discovered that it could be done.

The Salesman Looks at the Customer

PLANEPLANS are to take the place in industry to which the record makers have been awarded they will have to be sold, and the attitude and the experience of the salesman are important both to the salesman himself and to the possible customer. As we surveyed the industrial field we approached the customer from both sides. We asked the airplane owners what they thought about airplane salesmanship, and we asked a selected group of distributors to tell us about their own jobs, with special reference to the industrial market.

From all this miscellaneous material on sales methods, their sources are almost constant factor. Whatever his other deficiencies may be in individual instances or whatever the distributive organization of the industry may be, the airplane salesman has learned to present flying as a business necessity and not as a hobby-horse ride. In all our conversations with airplane owners, we find only two points that airplanes have made demonstrable to show or that their manner of presentation of their case has been so successful that it has resulted in the sale of the airplane. The technique of planning a campaign around the introduction of the airplane into industry may still be imperfect but it has been better than the salesman's goal.

If the distributors who answered our questions could be taken as a fair sample, and if there were ten times as many of them as there are, the business of selling airplanes would have no problems to make for it. All the various number of people could be seen who used to be wandering in the

fog with no definite plan of action and hoping to make sales by standing over them, but they are conspicuous by their absence. The great majority show a very clear understanding of the state of mind of the average manager, and a very keen sense of the ways in which it could best be met with methods duly adapted to the psychological and commercial circumstances of the individual case.

The plane must be fitted to the individual case. Therefore the individual case must be understood. It is a fact that some of the present owners of planes criticize the airplane sales organization severely for failure to analyze the individual prospect and his requirements, yet most of the distributors who have given us their views emphatically regarding the necessity of doing just that. The explanation may be that many of the present owners bought their planes four or five years ago and got their ideas at that time, and that airplanes in 1951 are doing a better and a more businesslike job than in 1946 or 1951.

Whether or not individual treatment should extend to the point of actually putting a plane to work in the customer's business for a time as a demonstration, a disputed question. A number of the present owners feel that such a proposition might be to lose much worth while and that the value of airplanes is not as an airplane salesman often into a prospective buyer take a car for a week-end, it is a sign of backwardness. The owners are presumably be convinced from any experience of relief, certainly as they already have airplanes and are not in the market for first rates, but in any case most of the distributors insist that if they start giving demonstrations that sort they will find themselves doing more jobs on such a scale that they would have to give up their regular character service and turn to the business demonstration and that they would never be able to make enough commissions to cover expenses. Some of them, to be sure, both with sympathy or a determined concentration to a

new truly good prospects and on giving them everything that could possibly be thought of in the way of a demonstration and backing it up with they are finally convinced of their need for their own plane. Others occupy the middle ground of offering to do jobs, in connection with the business of the prospective customer at below regular charter rates and to refund the amount paid for the flying out of the price of any airplane that he may subsequently purchase.

This matter of the type of demonstration that best shows off the capacity of the plane without making unreason-



It is appropriate for the reference to mention that this machine is not a "hot" machine.

able demands on time or training the distributors into unreasonable expenses is obviously one of moment interest. One of the largest Pacific Coast distributors believes that most of the selling can be done on the ground and that demonstrations should be limited to "short, concentrated hops." Several others put it in effect that local demonstrations, if carefully enough planned and demonstrated to keep the customer's attention on the short shows in terms of his own business, should make long trips or the loss of a plane for a limited business trial quite unnecessary. Much of course depends on the type of business involved and on the type of customer. It is something of a task, some to find that about two-thirds of the distributors who expressed an opinion considered the business model



enough to be under one man control a better prospect for an airplane, as a rule, than the large corporation. One reason apparently is that the small business leads first hand to the type of selling campaign with which the distributor is more familiar and which they generally favor. They are treated around a demonstration at the airport. With the big corporation much more is likely to depend on personal analysis of costs and operating figures, and the distributors who are most inclined to rely on statistical analysis as a primary selling tool are likely also to prefer the more conservative to the small one as a target. From headquarters New England, apparently, comes the most enthusiastically well-knowledge supporter of the individual effort. Others claim that the big company necessarily select the manner of purchasing a plane to cause absolute refusal for consideration without giving him final authority and that often he has taken a demonstration trip, however dubious he may be of any previous assessment of conditions, but afterwards begin to regard him as an unreliable character and to discount whatever he says.

All of a piece with the discussion about the kind of a demonstration is an aid and how much of a demonstration is the equivalent with the degree of integrity that a sales campaign should generate. Are business airplanes to be sold for business use, or is the president of the company that might buy one to be given a guide reminder that they serve other purposes? Is a representative, along with the salesmen, going over to the field, and that with a plane either not in stock or ready for a week-end? Most of the distributors play the recreational role pleasantly when the prospect gives them a strong lead in that direction, but some whose training the vision of momentary sale sets out to be pronounced as the very first approach and keeping it there. This category view is exposed, then, for the capacity belief seems to be that the big makes the selling plan, that the private person use and that as their business ability is better understood by the plane will play a decreasing part. Apparently, then, the business people get more and more used to flying the fading of need's facilities will lose whatever influence it now has in determining whether or not they are objects of business consideration shall cost their note in favor of the purchase of a company plane. At the present time the family alliance is sometimes a very real one, and it is one on which distributors with experience in the field operate themselves with considerable freedom. The weight of constant

comes to be in favor of keeping a demonstration on a purely business basis and leaving the wife and children at home. Typical is the remark of a distributor in southern California that: "I find it undesirable to take any other than the actual sales prospect along on a demonstration flight. For the same reason he has with him the less chance we stand to lose of commencing a



Many a wife has closed a sale for her husband who is doubtful.

sale." Too extreme to be typical is the view of a distributor from the Middle West: "There is no such risk of occurrence as you think of. The family here, and can give proof if required, that women are leading back the advancement of aviation seriously. The wife still wants mostly alone, all this, and she gets her strictly definitely endangered by this new when, as the consideration of her husband." Also from the Middle West comes the view of a publicist observation: "But what the prospect has been carefully diagnosed and is flying very it is advisable to have the family along. Many a wife has closed a sale by becoming enthusiastic when her husband was in doubt."

Whether details, even any or may not concern, and the security of investment, their husbands have apparently come to worry. Nothing is more striking in this survey than the strength of the conviction that the spread benefits of flying have virtually ceased to be a serious factor in sales discussion. Objections now seem to be almost exclusively economic. But of almost every economic objection, in first and, and perhaps that not enough will be found for the plane after it is bought to justify the investment. As present plane owners themselves have been quick to testify, the average business man has little idea of how low the cost of operating an airplane will run, and his objections in that score can be met by pointing and proving sound figures.

The citation of sales resistance, however, seems back over and over again to the factors of general inertia and indifference that have first to be overcome. When the prospective customer has once been persuaded to give his definite objection to flying the sale is well on the

way to being made, for definite objections can be definitely answered. The constant state of mind with which to deal is that of vague and confused half-interests, and it can best be met, where the necessary material exists, by presenting circumstantial records of the successful use of airplanes by other firms in the same kind of business as the prospect. With duly deferred acknowledgment in its content, the objection to ask the man who comes one ought to be answered by others at several.

For that reason, as well as in the general interests of cooperative behavior, the distributor first with a plane usually stands ready to get out of bed on the coldest night of winter, or to undergo practically any other personal inconvenience, may be necessary, to help the purchaser get satisfactory service from the ship. Testimony of successful distributors is almost unanimous on the desirability of helping the customer to find a suitable pilot and of offering him an servicing on the limitation of special equipment, as the possibility of particular flights and flying schedules, and of offering other than the company. Some go so far as to recommend a regular check on all ships, particularly those sold to industrial use, at intervals, for the purpose of seeing that the sale was not in fact a thing a proper job and that no opportunity of firing the plane into the reputation is being overlooked. Conversely, if a distributor gets too much involved with a customer's affairs and if the customer after purchasing the plane tries to make it do the impossible, he will doubt much on the salesman with him in his eye. As one old hand suggests, the industrial owner who runs into any difficulty or uncertainty about the distributor has done his job properly, to cause him with industry category.

"What's I do about this?" rather than with defensive evasion. "Look what you got me into!"

The best possible guarantee of the future of industrial use of airplanes is in the very fact that it has been possible to conduct such a survey as this and to get so many favorable opinions and so many records of actual experience both from distributors and from owners. The original technique of selling airplanes for business use is to get someone all-around about flying and then rush him off his feet before he spends the money for something else. The depressive spirit of this style of selling, but the development of the aviation business would have done so in any case. Whether considered from the point of view of the airplane manufacturer, the salesman, or the ultimate consumer, the possibility of an airplane for business need be no longer as when-
ever. For the husband of businessmen does not have airplanes, and for many husbands or themselves mean that they have their new her should and one day will, it has assumed the expected mark of an investment.

The Airplane Opens the Door for the Salesman

The direct advantages of an industrial airplane for executive transportation and for the specialized needs of many particular lines of business are obvious. The indirect gains in prestige and in impression made on the mind of the customer from the ownership of a plane is less immediately apparent, but sometimes even more important. The time may come when the ownership of a company airplane will be no more distinctive than the presence of a blonde reception-

ist in the front office, but it hasn't come yet in most industries, and for most companies the opportunity still exists of getting the credit that goes to a leader. Mr. Wassell tells a few true stories to prove the point. He has sold machinery without the use of airplanes, he has sold machinery (more successfully) with the use of airplanes, and he has sold airplanes to others who might make equally good use of them. So mixed an experience invites respectful hearing.

By C. R. Wassell

"**R**ICH is an airplane? I wouldn't get within a hundred feet of one of the things he sold me!" That was just fine, because I was not selling airplanes or radios. I was trying to sell machinery, and the gentleman who made that remark had it in his power to give me the order for it.

I had been selling on him for several years, but he had always brought from one of my competitors, whose machines were entirely satisfactory as to quality and price.

He was a busy man and one day, naturally, he should be bothered by me in any case, but he tried to change his mind. I was trying to sell machinery on one type of machine, which is good business unless you are selling the equipment that is not being used. If you are in that position, that is where the airplane comes in.



lowest priced up 800 per cent, and I was a millionaire.

I very seldom know the situation and find it the most difficult obstacle to his in moment. I know that a sale is longer percentage of sales are made on personal friendship, not that even through the purchaser from his own terms and terms to his sales talk he is a better man than before he got under the skin.

As my wife said, I decided to try an airplane. I went out right much of this winter's time for it. I did it would not see next time he would supply me with word that he was not making anything. So I read an airplane and flew to the prospect's city. He was hand-laid out I did not draw even a single line for a mile. Of course I could not forget about being able to fly. I agreed it would take me about three hours to get home, so I called about 3 o'clock to get me a good opening to mention flying.

I made my usual inquiry as to whether he was in need of any of my machines, although I knew he was in the market at that time. I asked him to let me add a

a proposition when out at the market, and remarked that I would run along, as I had to be in St. Louis that evening. He looked up, apparently pleased at being still to show me I was so dumb I didn't even know how far I was going, and asked how I expected to do that. I said over 400 miles to St. Louis! I told him I had flown over that morning and would surely make it home in time for dinner. "You'll break your neck if you don't fly very far from home things," he said. I asked him if he had ever been up, and he made the statement that leads this story.

At my rate I was home for dinner, and when I was called on the next in place of having with his paper as he usually did be looked up and asked, if I had got home on schedule the last time, he asked if I flew the plane myself, and a few other of the usual questions about flying. Just a few minutes of that, and I was able to hold his interest long enough to get over a description of one or two of the most important features of my machine.

I did no orders, and in every call he promised to inspect my factory and see our machines in operation, but he never did. However, every time I called he asked a few questions about flying, generally he would light me for some amount he had read about.

One day my plane ran and old Mr. Trench, Mr. Russell associated that was in St. Louis, had one hour to spare before train time and would come out and look at our factory if I could guarantee to get him back to the depot in time to catch his train.

I gave him about 45 minutes at the factory, he met the officials of our company and saw that we were a substantial unit having out a good product. He had been in St. Louis many times before and I am sure he never thought of my company, or my product could give him friendly conversations about flying.

Now he let me out on a job where our machines were especially reliable for meeting some special conditions. We got the order, and in about a year's time he had standardized our machines. He is still very much opposed to flying and I don't consider flying to him as fun, but his boy thinks it was a great idea, and he thinks he has the best boy in the world, and I think my machine

was the best ever, not the result is very important to my experience. He probably thinks he has beaten me.

Let me give another instance. The largest case of machines, such as I sold brought from my company for various customers in one I sold regularly for years and was treated consistently and that was all. I tried to get the customer to play golf with me, go to see the ball game, lunch or anything—without success. I sent him cigars for Christmas, which he returned with thanks. It was plain that he did not want to deal with me or my company.

He was told to see to me and I found no machine thing—so I put a third of mine who was on the inside track with this gentleman to ask him if I had ever taken him up for an airplane ride. My friend protested that he had just been up for his first ride and was all enthused about it.

The next time I called on the human called himself, he said, "I understand you fly." I admitted it, and told him it was a lot of fun. He made some remarks about birds and broken necks. Nothing new developed for a time, but apparently he returned to his family that some form information in airplane and wanted to take him up.

Several months later when I called he surprised me by asking me to sit down and told me that he had two boys who were very much interested in airplanes and that they had made him promise to get me to explain some to them and to be told, "let them take it."

Naturally, I said that I would be glad to do so at any time, beginning right now. To my very great surprise he asked his wife to sit in the car and to be told, "let them take it."

Any one interested in selling one of the boys out of school, and go to the field right away. In five minutes we were headed for the field to meet them.

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I had to run a larger plane to take them, and when we got started up and about ready, with the wife and boys all seated, papa came up and said he guessed he would go too.

Naturally, to say, they all enjoyed it, and themselves I was not only welcome as his other at any time, but soon was getting all his business.

I think the whole thing up thoroughly and am on the inside track, and therefore a probably selling his idea manager that I was needed, that would be a getting a ride-off for being from me, or some other able.

Really the only difference in we are now personally acquainted. The purchaser will now explain his needs to me in detail, I can have very clearly on just what he needs to meet the conditions, he gets a product at a very reasonable price, and every one is happy except the competitor who doesn't understand the psychology of that flying business.

There are many cases where the purchaser has no fly has around in much it might almost be considered lucky that any sales manager who ever said anything himself will appreciate the importance of intimate personal contact between the salesman and purchaser.

Every salesman selling a commodity for which an average order is \$5,000 or more will find it a very great advantage if he had got his customer or prospective customer to visit the factory. This is the best way to maintain flying. Try to get a prospect to visit your factory.

Remember one out of a hundred will say "how busy—can't spare the time." Then spring the airplane on him. He can leave tomorrow morning, he has to arrive evening, at a dinnering and dinner, bring the wife and children. Even if he won't go he will remember you when you next call, and if he mentions your offer at home and his own boys he is making. They will be selling you to him every evening at the dinner table.

It seems some thought to find the best men for an airplane in any particular kind of sales promotion work, but any sales manager who has ever got his results on an expense account has enough imagination to develop many ways of putting the plane to work. It is in the far more effective means of creating personal interest.



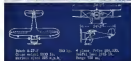
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Complete descriptive tabulations of dimensions, design characteristics, and performance, for the planes and engines shown and described in this section and for many others appear on page 136 and the pages that immediately follow it.



BECHT



BECHT is also looking down out of Wichita as a reminder of that city's prominence as a center of post-war light commercial aircraft construction and of the leading part that Walter Becht played in the development of Wichita's aircraft industry.

For these prices Mr. Becht has been building planes under his own name, conspicuous in appearance for square stagger and for some models retractable landing gear. The first of the line was flown in Nov. 6, 1932, and new designs and changes in detail have been frequent since then date. Becht's can come now in from four to five-passenger capacity and engines from the Jacobs 223 to the Caelsons 650 hp.

The structure is of steel throughout, including the wings, and the design shows a special concern for air-dynamic characteristics and high performance even to the use of a curved windward. Where landing gears are retractable they are fully streamlined and made to serve as a point of anchorage for flying wires to give an improved landing angle. Flaps for landing speed reduction and a steeper gliding angle are standard on all models. Stablers are fixed and longitudinal trim is maintained by the use of tabs on the elevator surfaces.

The performance data for two of the models are given on the drawings. The third, photographically illustrated with 400 hp engine is at 4,500 lb. gross weight carries a useful load of 1,800 lb. makes 195 m.p.h.

BELLANCA



BELLANCA monoplanes have been making their appearance with the public at large for a number of years on record-breaking flights including several across the Atlantic. A design record of 31 hours and 33 minutes established four years ago still stands. At the same time they have established themselves as a more restricted circle as high transporters and for general commercial service as well as for those private owners who want planes as large as those on which the company has specialized.

The Semo Skyscraper is designed to the present formula suggested by G. M. Bellanca more than a dozen years ago, a high wing monoplane with external bracing by struts broad enough to make a useful addition to the lift. The Aerocruiser follows a somewhat similar pattern, though with struts braced to a lower wing and is offset back in the single-engine form here shown and with two Wright Caelsons of 715 hp each and a maximum speed of 190 m.p.h. The wings of the Aerocruiser combine space with open-corded structure and ribs. Wing flaps being the landing speed of the two-engined model to below 90 m.p.h. on top of a wing load of over 23 lb. per sq. ft.

The Bellanca Semo is of entirely different form. A specialized design developed for Major Pilsbush to use as last year's MacBroomer, it has retractable landing gear, speed of better than 230 m.p.h. at 5,000 ft. with a two-row Pratt & Whitney engine giving 350 hp. at that altitude, 3,000 mile range.

CURTISS-WRIGHT



ALL-STATE manufacture under the flag of Curtiss-Wright has for ten years been divided between two plants, one making production craft for military and the commercial line in St. Louis. The commercial designs of the past few years have ranged from two-passenger capacity to twenty and from 40 to 1,400 lb. The range of products now offered in the market is slightly more restricted at the lower end, the smallest of the group still being the best of three-passenger capacity, 29 ft span and 175 hp. Here in line is the Sparhawk, a three-seater with conventional Whorward engines of from 250 to 420 hp and a top speed varying in accordance with power from 135 to 185 m.p.h.

The price of the Curtiss-Wright line is now as for a number of years past on the various successive lines the Condor transport. Though a variety of interior arrangements have been used in the Condor its standard capacity is fifteen passengers and two pilots, with two Cyclone engines turning up a total of 1,400 hp, a gross weight of 11,500 lb and a span of 82 ft. The wing loading is far below the usual transport practice—nonwithstanding the maximum speed of 190 m.p.h. at 8,000 ft. Condor wings are fabric-covered, but the interior structure is all-metal, welded steel, spars and chordlines also. Floorings of steel tubing.

Completely new in 1935 is the four-passenger amphibian with Whorward eng. at oblique primarily to serve the sportsman and remarkable for what is below the water of quality and extra wheel at the nose instead of the tail.

FAIRCHILD



SINCE inaugurating its present general line of production the Fairchild company has given primary attention to the needs of the private or industrial user who desires his flying done in a single compartment or two at most and attaches for that market attention to take a looking glass in the Fairchild line. They come in both open and closed forms, the former with a 100-hp. Wright Gyron in standard power plant, the latter which is made in either two or three-passenger seating arrangement with a Fairchild Ranger engine or the Warner Super Search of 145. The demand for open and rubber types has been such enough to keep the market closely divided between the two during the past season.

The open model with its four seats has approximately 25 m.p.h. less speed than the rubber type and about 2,000 lb. less weight and a third less range. The overall dimensions of the two two-seaters are very much the same, the three-seater being some 3 ft. more span and 10 per cent more wing area. The construction is the conventional combination of welded wing and steel tube fuselage. Seating in the rubber models is side by side with dual controls, the third seat where there is one is in the rear.

Other Fairchild models, new in the past year are the three-passenger low-wing monoplane with a top speed of 166 m.p.h. from a 225 Jacobs engine and a retractable landing gear, a large-capacity medium-speed single-engine freighter originally designed for the Army and a single-eng. amphibian built up for Pan American.

STINSON



STINSON 105/106



STINSON 107



During more than six years in which Stinson has been building four passenger planes everywhere there has been no great or sudden modification in the type but a steady evolution. Of the various models several hundred are now in service. The latest of them is like all its predecessors in having a high wing with strut bracing. Its landing gear is of the full cantilever type and suitable for its simplicity. The structure resembles that of most other light commercial planes of American manufacture in embodying a welded steel side fuselage, but it constitutes an individual and somewhat unusual element in combining spruce spars with light alloy ribs. Wing flaps are standard.

The Stinson company has been so faithful to the motor transport as to the medium-sized monoplane for power conversion. The 1913 Ackerly with three Lycoming engines rated at 350 hp each differs as structural material from the four-passenger Model 107 in having welded steel spars instead of wooden ones. The landing gear is retractable by electric power. Fuel tank allows for eight passengers and 500 lb. baggage or mail.

The most novel item on the list is an open cockpit parallel type training plane with Lycoming engine, a 120-mph speed and 400-mile range. The general type of structure is similar to that of the Ackerly, and the wing is of almost the same size.

DOUGLAS



THE LEADER of the Douglas showing, by the way of numbers produced or of reputation gained, is the two-engine transport DC-2 of which almost 100 are now traversing the airways of the world. Its four-engine passenger sound-cooled cabin and its performance are known wherever airplanes fly. The structure, like that of most recent transports and military planes as well, is light alloy monocoque with stressed skin wing. The material is Alclad, its fuselage corrosion-proofed, without protective coating. Engines are Wright Cyclones or Pratt & Whitney Horntails.

Two engines also is the Dolphin but in that case the wings are of wooden structure and with a plywood skin. It is available either as flying boat or straight amphibian with a 600 lb. difference in empty weight between the two and a corresponding change in useful load.

KELLETT



THE KELLETT airplane has recently shed its wings taking new direct control forces. Rotor gear has been streamlined, many internal parts streamlined, improved performance and improved handling result. With a folding rotor, the machine loads little more than gliders for storage.

KINNER



Kinner



Sportswing

KINNER has for many years built both engines and airplanes within a single manufacturing organization. The planes themselves speed into a wide range, five models being offered. In the open class the Sportster in two forms, one with 100 hp. engine, the other with 125 hp. heat-dispersed; and the Sportwing, 1125 hp. is available. Cabin ships include the Playboy, 1160 hp. 1, and the Emvay—a four place ship with 400 hp. Performance range from a top of 104 m.p.h. with the 100-hp. Sportster up to 165 m.p.h. for the Emvay. The rubber disc-rotor has a 525 mile cruising range, rather more than an ordinary figure for this category. All models, even the small ones, are fitted with full control on the elevators for longer patrol flights.



BOEING



100 B

BOEING two-engine transport model plane, with nearly two years of interest work on the airline now behind it, is the Boeing 247. Redesigned as the 247D with SHAG Wasp engines, performance, hot or two-engine, has been increased, passenger comfort increased, cruising speed raised nearly 20 m.p.h.

WACO



Cabin 4 seats



Model F, A



Model B

FOLLOWING almost a dozen pioneering years of building open biplanes, the Waco Aircraft Company branched out into four-passenger cabin biplanes, a ship that has had wide acceptance. The 1935 Waco standard cabin now opens in three models. Two are identical except for the alternative provision of a Continental 270 hp. engine or a Jumbo 225. The third, with 10 per cent more wing area and some 5 miles more speed, 1147 m.p.h. top, mounts a 250 hp. Whittle and has a cruising range of 560 miles; the other models running about 350.

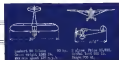
The custom model cabin now this year, opens with the same arrangement of engine and substantially the same wing area but about 12 to 15 miles more speed. The gross weight of all the cabin models is around 3,000 lb., and all are the push-and Waco-splined sliding landing gear.

For those who prefer to fly in the open, there is the Model F, again with a choice of Continental or Jumbo engines. The wings are of the same order as in the standard cabin models, with speed and cruising higher by about 5 miles and 1,500 ft. respectively. The last item on the list is a two-passenger biplane with removable cockpit enclosure, the Model D, with a 400 hp. Pratt & Whitney Wasp Jr. engine pulling it along at 195 m.p.h. and up to 21,000 ft. altitude. The structure, like that of all the other Wacos, is of spruce on the wing and welded chrome molybdenum steel tubing in the fuselage.

MARTIN



SPECIALISTS in large airplanes, the Martin Company has produced the largest yet in a four-engine DGM two-row transport. Bigger American airplanes in recent readiness to carry passengers across the Pacific. First American design to substitute one wing for the usual wing-tip floats.



LAMBERT

PIONEER among light cabin two-seaters, the Monocoupe is now available in the older Models 125 and B-145 (both Martin power), or in the current production Model 50 with Lambert R-260 engine. De Luxe 90A offers extra performance from improved landing, and addition of hump-ridge flaps.



NORTHROP

IN WIDESPREAD transport and industrial usage, the current Northrops adhere to the distinctive metal monocoque fuselage and stressed-skin multi-gage wing construction, to unswept landing gear. Among the first to adopt wing flaps, Northrop continues their use in production models.



CONSOLIDATED



REPT has engines backed by many years of the high testing that aviation leaders can give to military engines. are fitted with 125 hp or 160 hp. Knave engines respectively. Maximum speeds of 110 or 120 m.p.h. The PT-11C, a lighter and heavier two-place engine not here shown develops 132 m.p.h. top speed from a 250 hp. Whorland.



LAIRD



SINCE the appearance of the first Laird Swallow just after the War, the name has played a constant part in the aeronautical industry. In more than 20 years it has been used in many of the most important airplanes or machines put in small production for specialized service. The latest design is a six-passenger cabin machine with a top speed of 200 m.p.h., flaps to cut down the landing speed, and a streamlined monocoque fuselage—the last, a somewhat unusual feature in a machine of this size. The open biplane, both two and three-passenger, also shows from the customary standards in structure in having the fuselage forming of light alloy tubing. The two-passenger machine with a Whip engine does 190 m.p.h. at 3,000 ft. Cruising radii are generous 850 miles for the cabin machine, 600 to 700 miles for open models.



AIRPLANE DEVELOPMENT



Valco V-11



Seversky Aircraft Co. V-11
gross weight 1,500 lb.
max. speed 140 m.p.h.

A high performance multi purpose type is offered in the SDV-24. All-metal construction includes full wing-rigging, multiple horizontal wing with stressed dorsal skin. Suitable for naval type amphibian gear with retractable floats, with landing wheels protruding through fairings in the vent fairings.

STEARMAN



Stearman



Valco Aircraft Co. V-11
gross weight 1,500 lb.
max. speed 140 m.p.h.

OF THE single engine training biplane, Valco V-11 is the largest. Its design has been responsible for a series of high performance airplanes during the last ten years. Seeking features are careful calculation, simplicity and desirability of the remaining gear.

SEVERSKY



Seversky V-11



Stearman Aircraft Co. V-11
gross weight 1,500 lb.
max. speed 140 m.p.h.

ONLY extraordinary model offered is a conventional single bay airplane for two. One has 400 and 420 hp. from a 75 Whop. jet a high maximum speed. Note the feature: a combination wing (ground) landing gear with retractable wheels. Forward cockpit mounted gives higher performance as single seat.

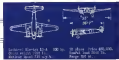
RYAN



Ryan S.T. gross weight 1,500 lb.
max. speed 140 m.p.h.

DISTINGUISHED by development from the conventional in usage of aircraft, the Ryan S.T. features a closed all-metal monocoque fuselage with full covered wings forward with space open dorsal ribs. Powered by Movent 5.7 offers the precise needs performance for low power.

LOCKHEED



Lockheed Aircraft Co. V-11
gross weight 1,500 lb.
max. speed 140 m.p.h.

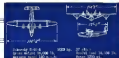


Lockheed



IN THE YEARS when the use of monocoque structure, cantilever wings and a smooth elliptical fuselage section were almost unknown, the name of Lockheed came to symbolize the type. Single-engine V-11s, One and Afters continue to Lockheed aircraft, all of which are in the 200 m.p.h. region. But the special concentration now is in the transport field. For which the Electra was designed and for which it has been purchased by a number of airlines both within and without American boundaries. With electrically operated retractable landing gear to help to use most of the speed range and flaps to help at the other. The Electra gets its performance with but 80 hp. per seating passenger. As in most other aircraft transports, the ground structure is almost monocoque throughout. Its gears are Pratt & Whitney Whop-jet or alternatively Wright Whirlwinds.

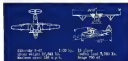
SIKORSKY



S-42



MODEL S-43



FOR many years the name Sikorsky has been associated with the design of large airplanes, particularly flying boats and amphibians. Step by step, Sikorsky production models have advanced in size and performance from S-38 through S-40 (first of the RMA "Chaparral") to the current S-42 and S-43. The former of which three out of a total of seven have been delivered to Pan American, is a four-engine flying boat for long range, ocean-going work. The hull is of aluminum alloy throughout wing and tail surfaces are dual-fuselage, part dual and part fillet covered. The S-43 is an amphibian for flying both without loading gear of smaller dimensions, but similar in general form and type of construction to S-42. The engines in both cases are Horch. Both S-42 and S-43 show high useful to gross load ratios—some 48 and 44 per cent, respectively.

TAYLOR



Cub 2

THREE versions of the Cub are offered, all substantially alike as to structure and form, but differing in power plant—usually at 35 hp. Condensed at 38 hp Aeromarine or 40 hp —which is normally seen but which is also available in an extra. Structurally conventional.

CUNNINGHAM-HALL



Model Y

ALL METAL construction with steel wing spars and a dual monocoque fuselage and a new type of variable-incident wing to suit the minimum speed which more than a plain flap would allow are the most distinctive features of the new Cunningham-Hall product. The landing gear is semi-retractable.



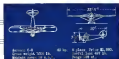
HAMMOND



Model Y

WINNER of the late D. C. design competition, the Hammond Y is a thoroughly unconventional type with unusual performance possibilities predicted for it. Side by side seating for two, wide angle of vision and three wheeled landing gear are attractive features for the private owner.

AERONAUTICAL CORPORATION



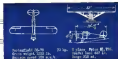
Model 1

WITH more than 200 machines of the same general class built in the last five years, the Aeronautical has a longer record of continuous production than any other light plane. It is available either as a tandem or biplane. Current production models are powered with a two-cylinder Aeromarine engine of 40 hp.

PORTERFIELD



Model 7-10



Porterfield 7-10
 Gross weight 1225 lb.
 Max. speed 120 m.p.h.

THE Porterfield two-place tandem open monoplane is designed to take either the 80 hp. Motor or the 70 hp. Lullford engine. With the latter it will cruise at 100 m.p.h. for 200 miles. Large windows and a transparent panel in the wing provide good vision for pilots.

HEARWIN



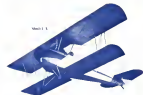
Hearwin



Hearwin Model 1000
 Gross weight 1100 lb.
 Max. speed 100 m.p.h.

DESIGNS the Speedster illustrated. Earwin offers the junior two-place open cockpit with optional water emulsifier monoplane powered with three cylinder 50 hp. American or engine. A recent machine (Model 1000) is a cabin for two, with Lullford engine of 70 hp. Construction and materials are conventional.

WILEY POST



Model 1

OUT of all past efforts to apply water emulsifier engines to aircraft the Wiley Post A is the sole commercial offering to date. Its modified Ford engine (46-1000) is the only liquid-cooled power plant now available for private use. A novel blend of conventional construction.



SECURITY-NATIONAL Aircraft Corporation offers the two-place Speedster powered with a Security 8-5 engine of 120 hp. Seaplane arrangement is also available.



THE FRANKLIN Doolittle-Turner now appears in a single model, the 27-44, powered with an upright A.C.E. Cirrus four-cylinder engine of 100 hp.



BUILT ORIGINALLY for the Midwestern Race, the Model Q-15 by Gamelle, Miller and DeLackner is available for high performance sports use.



OF CONVENTIONAL TYPE and construction, the S-4 Katy Hawk three-place biplane powered with a 8-5 Evers is patented by the Viking Flying Boat Company.



IN THE LIGHT PLANE category, American Eagle Lincoln Aircraft Company lists the S-32 Eagle for two people powered with the 45 hp. three-cylinder Sodality.



PIONEER DESIGNER for the home builder, International Aircraft Corporation also offers three factory built models powered with Hartz and Continental engines.



AIRCRAFT MECHANICS, Inc., offers two versions of the Flyabout and Continental and Sodality-powered. The Model A-14 biplane (Whitehead) is also available.



CESSNA comes to the 1935 market with a standard centerline monoplane for four powered with a Warner 145-hp. Super Scout. Flaps are standard equipment.



FOR FIFTEEN YEARS Bessie designs have been built around the broad skinned type fuselage. Latest model is all metal powered with two 65W Horvats.

Representative American Engines

The variety of the airplanes on display in these pages necessarily depends on the engine builder, for no airplane is built until there is an engine to go into it. The designer or the private purchaser with ideas of his own now finds himself presented a bill-of-fare among half a dozen different cylinder arrangements and powers ranging from a good-sized motor-car's to a good-sized locomotive's. A representative, but only a fractional, selection of the engine-making industry's 1933 offerings are displayed upon this page. An enormously greater number and variety are covered in detail by the tabulation on pages 146 and 161.



Scout Sixteen (Ford & Whittier Aircraft Company)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Whittier Manufacturing Company)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Ford & Whittier Aircraft Company)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Whittier Aircraft Corporation)



Scout Sixteen (Whittier Aircraft Corporation)

Accessories for the Airplane Owner

The stock airplane leaves the factory ready to go but leaves several accessories, but the manufacturer cannot foresee all of its purchaser's special wants, interests, and plans. The plane-owner will have to order these things himself by buying necessary equipment, and in most cases he must take the market for value and accessories as quickly as he gets acquainted with his new property and the full possible range of its usefulness. It ought to be the business of the airplane distributor to advise him on what he really needs to get the most out of the new fun out of his ship, and to show him how to spend his money to his advantage. The scope of choice, very wide, appears in part from these pages.



Convertible-fairing specialties are available as special equipment for greater improved cruising performance and speed.



As an example, a typical Cessna biplane, built.



The industrial center offers the expert work for a special machine.



A rapidly growing list of patents and industrial centers are available to make certain or even better communication as shown a necessity.



Passenger and pilot designed into seats, the comfort and convenience.



Standard industrial break systems may be incorporated in all sorts of special equipment and built-upon the performance-inducing data.



Rolls and Rolls Companies

Rolls-Royce Corp. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)

Rolls-Royce

Rolls-Royce Corp. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)

Rolls-Royce

Rolls-Royce Corp. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)

Instruments

Instrument Co. (London)
Instrument Co. (London)
Instrument Co. (London)
Instrument Co. (London)
Instrument Co. (London)

Controls

Control Co. (London)
Control Co. (London)
Control Co. (London)
Control Co. (London)
Control Co. (London)

Rolls-Royce

Rolls-Royce Corp. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)
Rolls-Royce Ltd. (London)

FLYING SERVICES and SCHOOLS

TOD judge the essay abiding in the 1935 annual W. E. Boeing Scholarship Competition. A committee will assemble at the Boeing School at Oakland, April 5 and 6. Its members are, Dr. Baldwin M. Woods, dean of the University of California, William Street of State Engineering Laboratories, Dearborn, Michigan; Professor John Alcock, head of Associated Engineering at the University of Minnesota; and Professor Allan G. Rindell, head of aeronautical engineering at the Carnegie Institute of Technology. The committee will also serve as judges of essays submitted by the Junior W. E. Boeing Scholarship winners offered this year for the first time to high school seniors of the Pacific Coast states.

• The Board of Governors of the National Aeronautic Association has approved a resolution to be sent to state governors pointing out that the taxation of aviation gasoline places an undue burden upon the industry, and requesting the governors of the states not exempting aviation gasoline to take the necessary executive or legislative action to effect the exemption.

• Forty Californians attended the MAA conference at Fresno March 3-6 to discuss aviation bills now before the state legislature. The meeting appointed a committee of four for the purpose of forming a widely representative body of aviation leaders within the state. Dudley Smith of the Lockheed Oil Company, was elected chairman, S. S. Chidester of Standard Oil Company, and J. W. Miller of Western Air Express, being the other members.

• Members of the Revenue Society of America have undertaken a campaign to raise money in order to take advantage of the offer of the Revenue Association of Commerce to match any amount up to \$1,000 that the Society can obtain for prizes at the 6th annual meet to be held at Denver from June 28 to July 14.

• A new glider club was recently organized by students of the Boeing School of Aeronautics at Philadelphia. A glider club has been organized and instruction will be in charge of Nicholas Rolke who has had considerable gliding experience. Officers of the club are, S. Cohen, president;

Thomas Jackson, vice-president; Nicholas Rolke, treasurer; and M. Schenckman, secretary.

• George W. Orr, president of Baccarat Field, Menlo Park, New York, has been elected treasurer of the Indianapolis Aviation Operators of the United States, succeeding Howard Aker, president of Waco State of New York. Oliver J. Parks was re-elected president, Ray Brown of the General Tire Company, Akron, Ohio, vice-president, and Louis K. Inwood, secretary. Chas. Jones, president of the Chazy Junior School of Aeronautics, Newark, N. J., Ray Brown and George Orr were appointed to permit plans for a winter office working hour for the association.

• Russell Moore, for the past four years operator of Moore Flying Service at Fort McKinley, Ohio, is now in charge of the Dayton, O., Municipal Airport at Vanlandi, succeeding Howard Moore. Mr. Moore intends to equip his new office Stinson and Grumman trainers for night flying instruction, will also teach solo construction and instrument flying.

• Ray F. Whitman, vice-president of the Consolidated Aircraft Corporation, is the new president of the Aero Club of Buffalo. Other officers named by the club are, H. P. Cook, Westport, N. Y., Howard H. Rook, vice-president; Ralph S. Dutton, secretary; Dr. Ray E. Scott,

secretary, and Raymond S. Medson, treasurer. This organization is one of the oldest flying clubs in the United States, having been incorporated in 1909. Among its 200 members are most of the pilots in the city, many people important in the life of the community.

• Lady Mary Beah, British pilot of many years' experience and formerly a resident of the United States, has taken over Dublin Air Centre, Ltd., with headquarters at Kildare Aerodrome, Dublin, Ireland. Three Gipsy Moths and a larger Free Moth are used for charter work and for instruction. Flying Manager of the school, which includes nearly 300 members, is A. K. H. Adams.

• Delegates to the second convention of the Canadian Flying Club Association met at Montreal March 6. The association comprises 22 clubs representing seven divisions: N. S., to Vancouver; B. C., with an aggregate membership of approximately 2,500. According to reports presented at the meeting, flying activities increased 8 per cent in 1934 over 1933 with member flying hours totaling 10,381 as compared with 9,571 in 1933. Licenses issued in 1934 included 124 private and 21 commercial certificates in comparison with 163 private and 26 commercial certificates in 1933.

Mayor General J. H. Macdonald, Commissioner of the Royal Canadian Mounted Police, was elected honorary president. Other officers for the coming year are, B. J. R. Pollock, of Hull, president; L. H. Smith, Hamilton, first vice-president; B. Marston, Montreal, second vice-president; H. H. K. Roberts, Toronto; H. H. Roberts, Fort William; J. A. Sely, Winnipeg.



A FULL ENROLLMENT

in the March report from the Boeing School of Aeronautics in Tacoma, W. A. 117 students in the first school, led in the night course training an airplane instructor as an aeronautical engineer. All the facts that had been set in a good by the school's authorities.

AVIATION PEOPLE

On March 30, THOMAS A. MORRIS was elected chairman of the board of Curtiss-Wright Corporation, to succeed the late Rowland P. Hoyt. Mr. Morris, who has been president of Curtiss-Wright for four years, was succeeded by Guy H. Vosseler, president of Wright Aeronautical Corporation, who will also remain president of the corporation. Mr. Vosseler joined his first connection with the industry in 1917 when he joined the Wright-McCord Aircraft Corporation, becoming history manager. He had the New Brunswick and Long Island factories. After the War, Mr. Vosseler became vice-president and general manager of Van Dusen Motor Company, Monroe, Mich., later president and general manager of Standard Steel & Bearing Company, Philadelphia. Beginning from the latter in 1925, he became vice-president and general manager of Wright Aeronautical Corporation, succeeding Charles L. Lawrence as president until the merger of the Curtiss and Wright groups in 1929.

• Officers of Headquarters Aircraft Association for the coming year will be FRANK H. REISER, retired pilot, Glendale, L. I., MARTIN, EDWARD R. WOOD, SEABOARD M. FLETCHER, vice-president; JOHN H. REAGAN, treasurer; CLAYTON J. BURGESS, secretary; SAMUEL S. BRONSTEIN, general manager. The board of directors is composed of C. F. BARON (Glenn Lohr), C. J. BARON (Glenn), M. S. FARMER (Philadelphia), R. H. FLETCHER (Cincinnati), J. H. KENNEDY (North American), W. A. MATA (Chicago), G. L. MARTIN (Martine), J. F. MORRIS (Chicago), J. M. ROSS (Douglas), F. H. REAGAN (Bald), W. E. VAUGHAN (Curtiss), and E. W. WILSON (Vought).

• RICHARD S. BENTLEY has been appointed State Coordinator, a new office inaugurated by the Bureau of Air Commerce. His chief duties will be to advise with state aviation officials in problems of legislation, regulation and promotion, and to give special attention to activities of commercial and private aircraft operators. After two years' service with the Army Air Service, Mr. Bentley became state aviation director for Tennessee, then president of the National Association of State Aviation Officials. Since September, 1933, he has been development expert for the Bureau of Air Commerce.

• T. J. CAMPBELL, for the last five years vice-president and general manager of Berry Brothers and Devereaux, has been elected president of the company, retaining his post of general manager. The retiring president, JAMES C. WITTENBERG, remains a member of the board.

• The Aeronautical Chapter of Commerce of America has re-elected THOMAS A. MORRIS president, and LAWRENCE W. ROSS vice-president. New officers are, vice-presidents, DONALD W. DANIELS, RICHARD E.



Guy H. Vosseler



Frank H. Reiser



Samuel S. Bronstein



Richard S. Bentley



T. J. Campbell

releasing his post of general manager. The retiring president, JAMES C. WITTENBERG, remains a member of the board.

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FLETCHER, and ALBERT FRANKS, secretary, GEORGE M. BURGESS, treasurer, CHARLES L. LAWRENCE, retired secretary, FREDERICK H. BARBER, and assistant secretaries, FRANK J. WALKER, EDWARD ROSS, and a new president, JAMES C. WITTENBERG, has since resigned.

• Twenty three years ago young SEYMOUR LIEBOWITZ, HENRY H. JARVIS attached to the Army's aviation staff, carried out a reconnaissance flight from College Park, Md., to Fort Myer, Va., and return. The trip was made in a Wright D pusher—the distance covered, 34 miles. Last year Lieutenant LIEBOWITZ commanded a main flight of Air Corps B-19 Martin bombers from Bolling Field to Alaska and return, covering approximately 3,200 miles. For the last three adventures Lieutenant LIEBOWITZ was made the first recipient of the Mackay Trophy. For the second Lieutenant LIEBOWITZ, now Brigadier General, Arnold has again been credited with the Army's most significant flight of the year, again making the Trophy.

• Pilot EDWARD T. ALLEN is now chief engineer for Eastern Air Lines, transport division at North American Aviation Co. After being discharged from the army in 1929 Mr. Allen became chief pilot for the National Advisory Committee for Aeronautics, this pilot of the Postoffice Department in 1930 he has served as consulting engineer for the Douglas, Northrop, Lockheed, Curtiss-Wright, Vought, General Aviation, Stearman, TWA and other American Great Airways. Most important of his recent work has been the development of a scientific basis for the carrying capacity of transport airplanes. In addition to his new duties, engineer-pilot Allen continues as regular Vought consultant, at on-call as Aviator's service of airlines on the flying record.

• "To make surveys of the Pan American Airways, to promote the interests of the United Aircraft Exports Corporation" are recent assignments that have earned W. DUNCAN from East Hartford to Shanghai, China. Consulting engineer for Chien Vought for the past three years, formerly head of the airplane section at Wright Field, then chief engineer for American, Alcock and Rogers, Mr. DUNCAN became assistant to the president of United Exports as he takes up his new duties.

• Following the resignation of L. BARNES GALT to enter the advertising field in New York, FRED STANLEY has been named as vice-president of Eastern Air Lines. Mr. Stanley was

THE MAINTENANCE NOTEBOOK

Power Distribution Board

PRACTICALLY every shop has its own solution to the problem of re-power distributed about the servicing hangar floor to lead portable flood lights, incandescent lights, or electric hand tools. Here is one worked out at Eastern Air Lines' Atlanta base that combines portability with a certain degree of stability and affords a means of storage for spare power and light cables. The single power point is bolted to a small welded steel tube zigzag. The "Y" at the top makes a convenient handle. Three short pieces of tubing, one welded on each leg, form a cradle into which the cables are coiled when not in use.

Cowl Storage

EVERY servicing hangar in the country is faced with the necessity of taking care of sections of cowling during repairs and engine maintenance. Ring cowings, wing fairings, nacelle coverings, wheel pants and exhaust

manifolds cannot be allowed to rack about on hangar floors or be piled indiscriminately in odd corners. The risk of damage both to parts and to personnel is too great.

A number of interesting solutions to this problem come to light in the service shops about the country. Coastal Air Lines at the Chesapeake station has worked out a compact portable rack arrangement which will take care of the complete cowling for one aircraft of a Boeing 247. The racks are built of wood mounted on large swiveling rubber-tired casters and have spaces marked out in black paint for each piece of cowling. This use provides an orderly working section can be long.

Other air lines use portable racks of a somewhat different pattern. TWA at Kansas City, for example, stores sheet metal parts on large portable stands somewhat similar to the usual engine parts rack. These racks are on casters, are built of angle iron with wooden shelves. Two America at Brownsville keeps on hand a number of large open top boxes, also on casters. The boxes are divided into three compartments each large enough to take the sheet metal parts from the nacelles and the nose engine of a Ford trimotor.

A rather novel but apparently effective solution, untried but has been worked out by the servicing department of American Industries, Inc., at Grand Central Airport, Glendale, N.Y. is the roof trussing a series of rafters has been hung, 2 or 3 ft apart along the hangar walls and a rope balmist rigged down to slats fastened to the wall directly below each rafter. As wheel pants, exhaust manifolds, cowling, etc. are removed from shops undergoing overhaul, each piece is hoisted to a rope and hoisted up overhead. In this way the floor is kept cleanly clear. Each piece is in place right and readily accessible when needed.

Handling Big Propellers

THE time has long since gone by in one-part maintenance shops, at least, where a mechanic could walk a

propeller inside the shop and then walk to the engine and install it. In this shop, the propeller is moved in the service bay of a Douglas trimotor.



propeller made hoisted and take it into the overhead shop by the simple expedient of carrying it on his shoulders. Some of the three-bladed contraptions are in service now 12 and 13 ft in diameter, weigh up to 350 lb and the shops where such equipment must be serviced have had to develop methods for handling which will not only be convenient but which will, at the same time, protect propellers from damage.

According to illustrations shown here the job is done in two of the company's overhead shops. At Kansas City, TWA has put into service a welded steel tube hoist mounted on small pneumatic road wheels to take care of the two propellers for a Douglas transport. The hoist can be rolled into place under the nose of each nacelle and, as the propeller is removed from the engine duct, it can be hoisted by means of an overhead beam onto the

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cradle. A strap around the upper blade holds the propeller in place when the hoist is pulled around the shop.

For American Airlines in servicing the big Shermans Clippers at Miami does the same job in a somewhat different way. The overhead hoist consists of a wooden platform on swiveling casters in the center of which a large wooden post is mounted. Near the top of the post is a spindle which projects through both sides at sufficient clearance to carry a propeller. The spindle is of somewhat smaller diameter than the propeller shaft, and is suitably pointed to prevent damage to the hub splines. The end of each cross arm is threaded and carries a nut and washer which prevents the propeller swinging off axis if it is tilted. A pair of wooden latches, which can be turned vertically or horizontally, prevent the propeller from rotating on the spindle. To get from the



For handling large convertible propellers, the American at Miami uses the device shown above. TWA's propeller hoist, at Kansas City, is shown below.



Two views of Coastal's method of moving and servicing nacelle assemblies of one end of engine bay containing six nacelles and nacelles.



hangar through the door into the propeller department the wooden latches are swung to the vertical position and the propeller partially rotated so it passes through the doorway. There is, of course, enough clearance to allow the vertical supports to pass through without striking the hub. Once inside, the propellers are handled by means of an overhead beam and trolley system which carries both the propeller table and balancing stand.

Cowling Nacelle Jig

AT American Airlines' Fort Worth plant, considerable time and money is being saved on Cowling Nacelle by the use of an engine nacelle jig on which the engine nacelles, cowling, pressure baffles, and cowling may be assembled and fitted up before being lowered as a unit in the engine bay. The jig is built of welded steel tubing, mounted on swiveling casters for easy transport about the servicing hangar. At the rear end, struts are arranged to



At Fort Worth's wheel pants point is shown on a Shermans Clipper.

correspond to the engine-mount struts on the plane and a small cable mounted on a vertical rod in the center supports the propeller shaft. By providing the forward support a great deal of stress is taken off the rear jig struts, making it possible to remove their alignment unaided, without going into expensive double beam construction.

Wheel Pants Guard

SOME time ago W.F. Van Gleet, who operates the Van Gleet Airplane Company in Hanger 8, Love Field, Dallas, became a bit fed up on repairing dents and scratches on wheel fairings on the airplanes used in his hangar. "No use" signs painted or hung on the wheel pants seemed to be of little effect in keeping people away, so he had his welders make up a number of tubular guards which he now keeps around the wheels of every airplane in use here. These simple protective devices are made of scrap tubing, are light and are easily stored when not in use, and have already saved many times their cost in repairs to landing gear struts.



Propeller power hoist

Accession dates and authors, respectively for the domains, from

Measure	Group 1		Group 2		Group 3		P-value
	Mean	SD	Mean	SD	Mean	SD	
Anxiety	Pretest anxiety	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest anxiety	1.5	1.5	1.5	1.5	1.5	0.001
	Pretest anxiety	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest anxiety	1.5	1.5	1.5	1.5	1.5	0.001
Depression	Pretest depression	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest depression	1.5	1.5	1.5	1.5	1.5	0.001
	Pretest depression	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest depression	1.5	1.5	1.5	1.5	1.5	0.001
Stress	Pretest stress	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest stress	1.5	1.5	1.5	1.5	1.5	0.001
	Pretest stress	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest stress	1.5	1.5	1.5	1.5	1.5	0.001
Quality of life	Pretest quality of life	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest quality of life	1.5	1.5	1.5	1.5	1.5	0.001
	Pretest quality of life	1.5	1.5	1.5	1.5	1.5	0.001
	Posttest quality of life	1.5	1.5	1.5	1.5	1.5	0.001

SINGLE ENGINED PLANES WITH SEATS FOR FEWER THAN FOUR PERSONS

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MULTI-ENCINED TO AROMATIC POLYIMIDES

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[illegible][illegible]

American airplane specifications [continued]

Accounting does not assume responsibility for the business given

[illegible]

American engine specifications

American data not shown representative for the engine given

Model	Cylinders	Displacement (cu in.)	Weight (lb.)	Horsepower (hp)	RPM	Fuel consumption (lb./hr.)	Oil consumption (lb./hr.)	Cooling system	Dimensions (in.)	Notes	Remarks
Continental	4	134	110	150	2400	12.5	1.5	Water pump	18 1/2 x 18 1/2 x 18 1/2	Continental Model 4	Continental Model 4
Continental	6	210	180	250	2400	20.0	2.5	Water pump	24 1/2 x 24 1/2 x 24 1/2	Continental Model 6	Continental Model 6
Continental	8	310	260	350	2400	30.0	3.5	Water pump	30 1/2 x 30 1/2 x 30 1/2	Continental Model 8	Continental Model 8
Continental	12	470	400	500	2400	45.0	5.5	Water pump	46 1/2 x 46 1/2 x 46 1/2	Continental Model 12	Continental Model 12
Continental	16	630	540	700	2400	60.0	7.5	Water pump	62 1/2 x 62 1/2 x 62 1/2	Continental Model 16	Continental Model 16
Continental	20	790	680	900	2400	75.0	9.5	Water pump	78 1/2 x 78 1/2 x 78 1/2	Continental Model 20	Continental Model 20
Continental	24	950	820	1100	2400	90.0	11.5	Water pump	94 1/2 x 94 1/2 x 94 1/2	Continental Model 24	Continental Model 24
Continental	30	1150	1000	1350	2400	110.0	14.0	Water pump	114 1/2 x 114 1/2 x 114 1/2	Continental Model 30	Continental Model 30
Continental	36	1350	1180	1600	2400	130.0	16.5	Water pump	134 1/2 x 134 1/2 x 134 1/2	Continental Model 36	Continental Model 36
Continental	42	1550	1350	1850	2400	150.0	19.0	Water pump	154 1/2 x 154 1/2 x 154 1/2	Continental Model 42	Continental Model 42
Continental	48	1750	1530	2100	2400	170.0	21.5	Water pump	174 1/2 x 174 1/2 x 174 1/2	Continental Model 48	Continental Model 48
Continental	54	1950	1710	2350	2400	190.0	24.0	Water pump	194 1/2 x 194 1/2 x 194 1/2	Continental Model 54	Continental Model 54
Continental	60	2150	1890	2600	2400	210.0	26.5	Water pump	214 1/2 x 214 1/2 x 214 1/2	Continental Model 60	Continental Model 60
Continental	66	2350	2070	2850	2400	230.0	29.0	Water pump	234 1/2 x 234 1/2 x 234 1/2	Continental Model 66	Continental Model 66
Continental	72	2550	2250	3100	2400	250.0	31.5	Water pump	254 1/2 x 254 1/2 x 254 1/2	Continental Model 72	Continental Model 72
Continental	78	2750	2430	3350	2400	270.0	34.0	Water pump	274 1/2 x 274 1/2 x 274 1/2	Continental Model 78	Continental Model 78
Continental	84	2950	2610	3600	2400	290.0	36.5	Water pump	294 1/2 x 294 1/2 x 294 1/2	Continental Model 84	Continental Model 84
Continental	90	3150	2790	3850	2400	310.0	39.0	Water pump	314 1/2 x 314 1/2 x 314 1/2	Continental Model 90	Continental Model 90
Continental	96	3350	2970	4100	2400	330.0	41.5	Water pump	334 1/2 x 334 1/2 x 334 1/2	Continental Model 96	Continental Model 96
Continental	102	3550	3150	4350	2400	350.0	44.0	Water pump	354 1/2 x 354 1/2 x 354 1/2	Continental Model 102	Continental Model 102
Continental	108	3750	3330	4600	2400	370.0	46.5	Water pump	374 1/2 x 374 1/2 x 374 1/2	Continental Model 108	Continental Model 108
Continental	114	3950	3510	4850	2400	390.0	49.0	Water pump	394 1/2 x 394 1/2 x 394 1/2	Continental Model 114	Continental Model 114
Continental	120	4150	3690	5100	2400	410.0	51.5	Water pump	414 1/2 x 414 1/2 x 414 1/2	Continental Model 120	Continental Model 120
Continental	126	4350	3870	5350	2400	430.0	54.0	Water pump	434 1/2 x 434 1/2 x 434 1/2	Continental Model 126	Continental Model 126
Continental	132	4550	4050	5600	2400	450.0	56.5	Water pump	454 1/2 x 454 1/2 x 454 1/2	Continental Model 132	Continental Model 132
Continental	138	4750	4230	5850	2400	470.0	59.0	Water pump	474 1/2 x 474 1/2 x 474 1/2	Continental Model 138	Continental Model 138
Continental	144	4950	4410	6100	2400	490.0	61.5	Water pump	494 1/2 x 494 1/2 x 494 1/2	Continental Model 144	Continental Model 144
Continental	150	5150	4590	6350	2400	510.0	64.0	Water pump	514 1/2 x 514 1/2 x 514 1/2	Continental Model 150	Continental Model 150
Continental	156	5350	4770	6600	2400	530.0	66.5	Water pump	534 1/2 x 534 1/2 x 534 1/2	Continental Model 156	Continental Model 156
Continental	162	5550	4950	6850	2400	550.0	69.0	Water pump	554 1/2 x 554 1/2 x 554 1/2	Continental Model 162	Continental Model 162
Continental	168	5750	5130	7100	2400	570.0	71.5	Water pump	574 1/2 x 574 1/2 x 574 1/2	Continental Model 168	Continental Model 168
Continental	174	5950	5310	7350	2400	590.0	74.0	Water pump	594 1/2 x 594 1/2 x 594 1/2	Continental Model 174	Continental Model 174
Continental	180	6150	5490	7600	2400	610.0	76.5	Water pump	614 1/2 x 614 1/2 x 614 1/2	Continental Model 180	Continental Model 180
Continental	186	6350	5670	7850	2400	630.0	79.0	Water pump	634 1/2 x 634 1/2 x 634 1/2	Continental Model 186	Continental Model 186
Continental	192	6550	5850	8100	2400	650.0	81.5	Water pump	654 1/2 x 654 1/2 x 654 1/2	Continental Model 192	Continental Model 192
Continental	198	6750	6030	8350	2400	670.0	84.0	Water pump	674 1/2 x 674 1/2 x 674 1/2	Continental Model 198	Continental Model 198
Continental	204	6950	6210	8600	2400	690.0	86.5	Water pump	694 1/2 x 694 1/2 x 694 1/2	Continental Model 204	Continental Model 204
Continental	210	7150	6390	8850	2400	710.0	89.0	Water pump	714 1/2 x 714 1/2 x 714 1/2	Continental Model 210	Continental Model 210
Continental	216	7350	6570	9100	2400	730.0	91.5	Water pump	734 1/2 x 734 1/2 x 734 1/2	Continental Model 216	Continental Model 216
Continental	222	7550	6750	9350	2400	750.0	94.0	Water pump	754 1/2 x 754 1/2 x 754 1/2	Continental Model 222	Continental Model 222
Continental	228	7750	6930	9600	2400	770.0	96.5	Water pump	774 1/2 x 774 1/2 x 774 1/2	Continental Model 228	Continental Model 228
Continental	234	7950	7110	9850	2400	790.0	99.0	Water pump	794 1/2 x 794 1/2 x 794 1/2	Continental Model 234	Continental Model 234
Continental	240	8150	7290	10100	2400	810.0	101.5	Water pump	814 1/2 x 814 1/2 x 814 1/2	Continental Model 240	Continental Model 240
Continental	246	8350	7470	10350	2400	830.0	104.0	Water pump	834 1/2 x 834 1/2 x 834 1/2	Continental Model 246	Continental Model 246
Continental	252	8550	7650	10600	2400	850.0	106.5	Water pump	854 1/2 x 854 1/2 x 854 1/2	Continental Model 252	Continental Model 252
Continental	258	8750	7830	10850	2400	870.0	109.0	Water pump	874 1/2 x 874 1/2 x 874 1/2	Continental Model 258	Continental Model 258
Continental	264	8950	8010	11100	2400	890.0	111.5	Water pump	894 1/2 x 894 1/2 x 894 1/2	Continental Model 264	Continental Model 264
Continental	270	9150	8190	11350	2400	910.0	114.0	Water pump	914 1/2 x 914 1/2 x 914 1/2	Continental Model 270	Continental Model 270
Continental	276	9350	8370	11600	2400	930.0	116.5	Water pump	934 1/2 x 934 1/2 x 934 1/2	Continental Model 276	Continental Model 276
Continental	282	9550	8550	11850	2400	950.0	119.0	Water pump	954 1/2 x 954 1/2 x 954 1/2	Continental Model 282	Continental Model 282
Continental	288	9750	8730	12100	2400	970.0	121.5	Water pump	974 1/2 x 974 1/2 x 974 1/2	Continental Model 288	Continental Model 288
Continental	294	9950	8910	12350	2400	990.0	124.0	Water pump	994 1/2 x 994 1/2 x 994 1/2	Continental Model 294	Continental Model 294
Continental	300	10150	9090	12600	2400	1010.0	126.5	Water pump	1014 1/2 x 1014 1/2 x 1014 1/2	Continental Model 300	Continental Model 300
Continental	306	10350	9270	12850	2400	1030.0	129.0	Water pump	1034 1/2 x 1034 1/2 x 1034 1/2	Continental Model 306	Continental Model 306
Continental	312	10550	9450	13100	2400	1050.0	131.5	Water pump	1054 1/2 x 1054 1/2 x 1054 1/2	Continental Model 312	Continental Model 312
Continental	318	10750	9630	13350	2400	1070.0	134.0	Water pump	1074 1/2 x 1074 1/2 x 1074 1/2	Continental Model 318	Continental Model 318
Continental	324	10950	9810	13600	2400	1090.0	136.5	Water pump	1094 1/2 x 1094 1/2 x 1094 1/2	Continental Model 324	Continental Model 324
Continental	330	11150	10000	13850	2400	1110.0	139.0	Water pump	1114 1/2 x 1114 1/2 x 1114 1/2	Continental Model 330	Continental Model 330
Continental	336	11350	10180	14100	2400	1130.0	141.5	Water pump	1134 1/2 x 1134 1/2 x 1134 1/2	Continental Model 336	Continental Model 336
Continental	342	11550	10360	14350	2400	1150.0	144.0	Water pump	1154 1/2 x 1154 1/2 x 1154 1/2	Continental Model 342	Continental Model 342
Continental	348	11750	10540	14600	2400	1170.0	146.5	Water pump	1174 1/2 x 1174 1/2 x 1174 1/2	Continental Model 348	Continental Model 348
Continental	354	11950	10720	14850	2400	1190.0	149.0	Water pump	1194 1/2 x 1194 1/2 x 1194 1/2	Continental Model 354	Continental Model 354
Continental	360	12150	10900	15100	2400	1210.0	151.5	Water pump	1214 1/2 x 1214 1/2 x 1214 1/2	Continental Model 360	Continental Model 360
Continental	366	12350	11080	15350	2400	1230.0	154.0	Water pump	1234 1/2 x 1234 1/2 x 1234 1/2	Continental Model 366	Continental Model 366
Continental	372	12550	11260	15600	2400	1250.0	156.5	Water pump	1254 1/2 x 1254 1/2 x 1254 1/2	Continental Model 372	Continental Model 372
Continental	378	12750	11440	15850	2400	1270.0	159.0	Water pump	1274 1/2 x 1274 1/2 x 1274 1/2	Continental Model 378	Continental Model 378
Continental	384	12950	11620	16100	2400	1290.0	161.5	Water pump	1294 1/2 x 1294 1/2 x 1294 1/2	Continental Model 384	Continental Model 384
Continental	390	13150	11800	16350	2400	1310.0	164.0	Water pump	1314 1/2 x 1314 1/2 x 1314 1/2	Continental Model 390	Continental Model 390
Continental	396	13350	11980	16600	2400	1330.0	166.5	Water pump	1334 1/2 x 1334 1/2 x 1334 1/2	Continental Model 396	Continental Model 396
Continental	402	13550	12160	16850	2400	1350.0	169.0	Water pump	1354 1/2 x 1354 1/2 x 1354 1/2	Continental Model 402	Continental Model 402
Continental	408	13750	12340	17100	2400	1370.0	171.5	Water pump	1374 1/2 x 1374 1/2 x 1374 1/2	Continental Model 408	Continental Model 408
Continental	414	13950	12520	17350	2400	1390.0	174.0	Water pump	1394 1/2 x 1394 1/2 x 1394 1/2	Continental Model 414	Continental Model 414
Continental	420	14150	12700	17600	2400	1410.0	176.5	Water pump	1414 1/2 x 1414 1/2 x 1414 1/2	Continental Model 420	Continental Model 420
Continental	426	14350	12880	17850	2400	1430.0	179.0	Water pump	1434 1/2 x 1434 1/2 x 1434 1/2	Continental Model 426	Continental Model 426
Continental	432	14550	13060	18100	2400	1450.0	181.5	Water pump	1454 1/2 x 1454 1/2 x 1454 1/2	Continental Model 432	Continental Model 432
Continental	438	14750	13240	18350	2400	1470.0	184.0	Water pump	1474 1/2 x 1474 1/2 x 1474 1/2	Continental Model 438	Continental Model 438
Continental	444	14950	13420	18600	2400	1490.0	186.5	Water pump	1494 1/2 x 1494 1/2 x 1494 1/2	Continental Model 444	Continental Model 444
Continental	450	15150	13600	18850	2400	1510.0	189.0	Water pump	1514 1/2 x 1514 1/2 x 1514 1/2	Continental Model 450	Continental Model 450
Continental	456	15350	13780	19100	2400	1530.0	191.5	Water pump	1534 1/2 x 1534 1/2 x 1534 1/2	Continental Model 456	Continental Model 456
Continental	462	15550	13960	19350	2400	1550.0	194.0	Water pump	1554 1/2 x 1554 1/2 x 1554 1/2	Continental Model 462	Continental Model 462
Continental	468	15750	14140	19600	2400	1570.0	196.5	Water pump	1574 1/2 x 1574 1/2 x 1574 1/2	Continental Model 468	Continental Model 468
Continental	474	15950	14320	19850	2400	1590.0	199.0	Water pump	1594 1/2 x 1594 1/2 x 1594 1/2	Continental Model 474	Continental Model 474
Continental	480	16150	14500	20100	2400	1610.0	201.5	Water pump	1614 1/2 x 1614 1/2 x 1614 1/2	Continental Model 480	Continental Model 480
Continental	486	16350	14680	20350	2400	1630.0	204.0	Water pump	1634 1/2 x 1634 1/2 x 1634 1/2	Continental Model 486	Continental Model 486
Continental	492	16550	14860	20600	2400	1650.0	206.5	Water pump	1654 1/2 x 1654 1/2 x 1654 1/2	Continental Model 492	Continental Model 492
Continental	498	16750	15040	20850	2400	1670.0	209.0	Water pump	16		



THE BUYERS' LOG BOOK

AVIATION's Card Index of New Equipment

This department is equipped to help readers locate manufacturers of equipment, accessories or materials

AIRPLANE ACCESSORIES

Aircraft Fuses

Latellus Laboratories
4867 Riverwood Ave., Chicago, Ill.

IMPORTANT anti-vibration feature of Latellus' new aircraft and aircraft radio transmitters, is a 50 day "twist" gives the inside tube at the center. Lead caps, tubes, and line element are joined together with special solder. Low voltage type, glass enclosed, 25-250 volts. High voltage series, fiber enclosed, total for 1,000, 2,500, 3,000 volt series.

Aviation, April, 1951

AIRPORT EQUIPMENT

Emergency Light

National Carbine Sales Corp.
Carson Building, New York, N. Y.

A NEW 5,000 cp. emergency carbide light adaptable to A airport, use weighs 40 lb. when fully charged, lasts three hours or longer when operated intermittently on a 10% charge. A non spill feature is incorporated. Reflector mounted on a universal swivel joint, shifts light to any angle. Fully for carrying by hand, above carbide lighter. When extended 25 ft. high, 28 in. when folded.

Aviation, April, 1952

AIRPORT EQUIPMENT

Fire Extinguisher

Pyrene Manufacturing Co.
Riverside, N. J.

NEW 2-gal. expiring liquid fire extinguisher designed by air pressure. Delivers fan-shaped spray or solid stream. No leads in pump, pressure controllable at any rate having 100 lb. pressure. Weight 164 lb. fully charged; 18 in. high, 3 in. diameter. In operation by opening valve on top and controlling combination discharge nozzle. Circular available.

Aviation, April, 1952

ENGINE ACCESSORIES

Battery Ignition Units

Saville Magneto Co.
Sydney, New York

NEW radio shielded timer, coils, ignition switch for lighter aircraft engines is announced. Type WL timer has bearing mounted, grease packed, available for conventional timer mounting or for magnet replacement. Single or double breaker. Overvoltage spark governor built in. Ignition switch has independent battery and generator leads to safety feature.

Aviation, April, 1952

RADIO

Aircraft Radio (catalog)

Loar Developments Inc.
225 W. 17th Street, New York, N. Y.

COMPLETLY description of all Loar products and manufacturing facilities contained in new booklet "Aircraft Radio." Covers the special component built for the Loar-McIntosh radio, also standard products—the Model K. Dynastar (factory day K-3 Band receiver, the Model LACT-1 transmitter transmitter, and the 10 watt and 35 watt (LACT-1) transmitter for the private flyer.

Aviation, April, 1952

RADIO

Airplane Receiver

Western Electric Co.
200 Broadway, New York, N. Y.

FOR weather and beacon signal service for the private pilot new receiver measures 7 1/2 in. wide, weighs 11 lb., covers the 250/400 kc. or 350/1,500 kc. bands. Super-heterodyne circuit, only three tubes, requires short antenna, operates with earphones. Pilot's supply from 5 or 12-volt battery. Plate supply 16 milliamperes at 90 volts, permitting use of dry B battery.

Aviation, April, 1952

RADIO EQUIPMENT

Radio Receiver

Schubert & Sons, Inc.
Boston, N. J.

MODEL 58R-2 beacon receiver, designed primarily for private flyer, is a four-tube superheterodyne, 184 to 420 kc. frequency, with output of 750 milliwatts and sensitivity of 1 microvolt. Receiver designed for panel mounting but may be modified where convenient as shockproofing not required. Equipped with shielded phone lead and jack box. 4 1/2 lb. for battery operation, with dynamotor 14 lb.

Aviation, April, 1952

SHOP EQUIPMENT

Battery Tester

General Electric Co.
Bridgeport, Conn.

TUNGAR battery cell tester may be used both for high-rate discharge tests or for open-circuit tests. Permits to be the hand of the operator. Large, easily read meter at top of handle (combined as rubber guard for protection) has usual voltage scale, also voltmeters to simplify readings. Switch, at thumbcock type, is between the two calibrations of battery tests.

Aviation, April, 1952

B E N D I X

AIRPLANE WHEELS •
BRAKES • PILOT SEATS
AND PNEUDRAULIC
SHOCK STRUTS

THE REASON OF AVIATION SAFETY

AIRPLANE PRODUCTS

BRAKE WHEELS

High and Low Pressure "Streamline"

★

TAIL WHEELS

Low Pressure "Streamline"

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AXLES

For All Wheels

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Mechanically and Hydraulically Operated

★

OPERATING CYLINDERS FOR HYDRAULIC BRAKES

with Flexible Hoses and Fittings

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For "Streamline" Wheels
Steerable and Swivelable
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PNEUDRAULIC SHOCK STRUTS

Designed and Tested to Meet Individual Requirements

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Standard Army and Navy Type

BENDIX PRODUCTS CORPORATION

AIRPLANE WHEELS AND BRAKE DIVISION • SOUTH BEND, INDIANA

(Exclusively of Bendix Aviation Corporation)

It's Arms that

*She Takes To The Air On Wings—
But Rocker Arms Keep Her There*



Rocker Arms are subject to heat and pressure that quickly destroy ordinary grease. Mafak has demonstrated its ability to lubricate this tough job efficiently under extremes of operating conditions. It "stays put." It minimizes wear, reduces time out of service, lessens the expense of engine overhauls.

Especially Effective for Controllable-Pitch Propellers

When Northwest Airlines—"Shortest Route from Chicago to Seattle"—installed controllable-pitch propellers they found most greases caused trouble and expense—measured safety. They put Mafak on this job and said, "It doesn't channel or gall

but remains in the assembly and assures constant lubrication for slides and counterbalances.

Millions of Miles of Flying Prove Mafak

Leaders of commercial aviation such as "American Air Lines," "Boeing," "Central Airlines," choose Mafak because it is the most effective lubricant for Rocker Arms. It also provides a valuable extra margin of safety—speed—economy.

At all airports you will find Mafak and the complete line of Texaco Fuel and Lubricants. A Texaco representative will gladly help you select those best suited to your ship.

THE TEXACO COMPANY—130 East 42nd Street, N. Y. C.

TEXACO Aviation PRODUCTS



TEXACO AIRPLANE OIL — TEXACO AVIATION
GASOLINE — TEXACO MAFAK — TEXACO ASPHALT
PRODUCTS FOR RUNWAYS, WINGWALK FLOORS, APRONS
AND DUST LAYING.

THERE IS AN EXTRA MARGIN OF SAFETY, SPEED

hold her up!



AND ECONOMY IN TEXACO AVIATION PRODUCTS

FAIRCHILD *airplanes*



• Fairchild "24"—Warner-powered . . .

extremely popular since its introduction a year ago. The 1933 model facilitates even more distinctive standards of quality craftsmanship and light characteristics extended range, calm airplane. Engines 130 H. P. H. cruising speed 145 M.P.H., carrying 2 persons and 237 lbs. of baggage and accessories to a cruising range of 490 miles at 21.6 miles per gallon. Practiced, intelligently so, least constructed airplanes were subjected to pitot errors, use 100 lbs. for all available parts, including and maintenance of all metal work, electric wiring, battery, engine, fuel, wheel, axle, tire, and other parts, and other and very other features add to cross-country comfort, light efficiency and durability.



• Fairchild "24"—Ranger-powered . . .

The Ranger engine equipped engine now available in this popular model. The Ranger engine features successful mobility, exceptional smoothness and practical efficiency at 20-hour operation because of internally lubricated valve mechanism. Fairchild quality makes this combination of plane and engine most attractive.



• Fairchild "22"—Warner-powered

one light in this class will literally make the expert as well as the novice pilot. Dressed outfit produced by extremely responsive engine control as indicated with a suggestion of conditions that actually render a complete picture of available. Between stability even in complete still position, makes it an ideal plane for any kind of flying . . . 80 miles per hour, advanced, no secondary. Used for military training purposes and by sportsmen there who choose carefully to obtain the finest in experience and positive work in camp. The new construction feature found in the "22" are incorporated in the splendid lightness sport plane.



• Fairchild "45"—Jacobs-powered . . .

one to establish new standards in high speed personal utility plane. A full tank, low wing with retractable gear, carrying 5 passengers and 250 lbs. of baggage plus fuel equipment, 152-200 H. P. H. cruising, 48 M. P. H. landing with 800 lbs. of baggage, excellent performance with maximum speed in all altitudes. This Fairchild is designed to establish new records in the lightest and most comfortable and will be generally available for early summer deliveries.



• Fairchild "22"—Gipsy-powered . . .

Fairchild quality construction provides means of the lowest price built, but the more full feature control system, constant pressure, power like kind, arrangement, positive workmanship and durability found in larger Fairchild make this plane most important for sport and touring because of lowest maintenance and longer life. Used only 10-15 gallons per hour and economy of 18 M. P. H. This also often operates a splendid opportunity to increase touring activity by offering a truly low expense to students, between shock absorption and wide travel, landing gear equipped with landing gear for elementary training. Exceptional strength provides advanced work of all types, initial cost surprisingly low. Write for details, naming model to which you are interested.



FAIRCHILD AIRCRAFT CORP.
HAGETTOWN · MARYLAND



cameras ~ instruments ~ engines

• The KRUESI Radio Compass

This is the latest Fairchild product. It has been so successful as one of the key test of the U. S. Army Air Corps' blind landing system, and has recently been adopted as standard equipment by the Bureau of Air Commerce of the Department of Commerce. It is now available to air transport lines, commercial operators and private pilots.

The Kruesi Radio Compass simplifies aerial navigation to a degree never before possible. It indicates a course to an objective at all times and under all conditions. Flight can now be undertaken under adverse atmospheric and meteorological conditions which ordinarily make safe operations impossible.

Complete information furnished upon request.

• A New Improved CYCLOPS Aerial Camera

Good aerial photographs add to the pleasure of the sportsman pilot and offer a source of increased revenues to the commercial operator.

... and the new, improved CYCLOPS offers the means for obtaining GOOD aerial photographs. Designed to include several new refinements, it is the outstanding aerial camera value on the market today. Many of its new features are identical with those before found only in the more expensive Fairchild Aerial Cameras used by commercial and military aerial photographic organizations.

With the new CYCLOPS, the sportsman pilot, amateur aerial photographer and aircraft operator will have no difficulty in obtaining sharp, clearly-defined aerial photographs of professional quality which can be enlarged many times without loss of sharpness.

We have a limited supply of interesting and valuable photographs on the various phases of aerial photography. Copies are available without obligation to those interested.

FAIRCHILD AERIAL CAMERA CORP.

62-12 Woodside Ave. Woodside (New York), N. Y.

• In-line Air-Cooled Engines



After three years of intensive development, testing and flying, a new series of in-line, air-cooled engines has been perfected. Available in power classifications ranging from the 145 H. P. six cylinder to a 420 H. P. geared and super charged 12 cylinder V type, these engines feature low fuel and oil consumption, smoothness and absence of periodic vibration. The valve mechanism is completely enclosed and internally lubricated. Except for moisture, there is nothing to oil or grease. Servicing the engine, no maintenance or checking is required between actual flights.

These engines have had extensive flying in several types of planes. One, World War II, now operating at large ship's body for the U. S. Navy, states: "The 6-390 Ranger engine in my plane has been extremely satisfactory. To date it has had about 400 total hours and has required no major work. It will remain at peak efficiency and economy of engine parts. Comparison and same uniform for all cylinders and the power. And even the same as when new. No engine trouble of any kind has occurred during any flight and its smooth running qualities at any speed have been frequently the subject of comment by qualified passengers."

The Ranger Engineering Corporation, a Fairchild subsidiary, is fully equipped with latest type machinery and manufacturing facilities, and as a position to concentrate on the design and construction of large, high performance engines endowed with Fairchild quality and precision craftsmanship.



RANGER ENGINEERING CORP.

Farmingdale, L. I. New York





— — — and now
for the record
and a look ahead

THE aviation industry is now headed for a period of orderly expansion. Total production and sales during the fiscal year beginning July promise to be greater than in any year since 1929.

An unprecedented production output of nearly 50 million dollars for Army and Navy aircraft and engines, as an proved commercial aviation outlook, are the main factors supporting this optimistic viewpoint.

In planning for this greater activity, the industry must largely be guided by its present capacity and recent record of performance. The moments and trends, the facts and figures in all their broad long business must be studied and put to work.

Here then is presented an industry need which AVIATION plans to meet in its timely

Survey and Prospect Issue— Ready May 1st

This valuable annual review is welcomed by the industry and our national legislators as an authoritative factual picture showing the importance of the

American aircraft industry from the economic and air-minded defense standpoints.

In this same facts are reviewed and interpreted — are given meaning and definite application to the industry's problems. Especially timely this year will be the editor's outline of future prospects.

This is the sort you have been waiting for — it will contain inside information (much of it exclusive) covering airplane and engine design and production, transport activities, including reports on air mail, passenger and express business, data on airplanes and pilots, airport developments, foreign trade statistics, Army and Navy developments, etc. This is the kind of information the industry needs and uses in its planning, doubly welcome because it is presented and interpreted in a clear, vital way. The regular news section and departments will appear as usual.

TO ADVERTISERS.

To fit your product into present thinking and planning, tell your sales story to the industry in this Survey and Prospect Number of Aviation. Ready early in May, it is in time for the industry, and the year's work.

You will want this issue not only for its immediate value but to keep the reference throughout the year. The demand always exceeds the supply, so place your order in advance to avoid disappointment.

AVIATION

Edited by Edward F. Warner

A McGRAW-HILL Publication, 330 West 42nd Street, New York, N. Y.

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for transportation of personnel

The Envoy is a superb four-place cabin airplane equipped with the 300 h.p. Kinner Engine at 1750 R.P.M. It cruises 150 m.p.h. (guaranteed).

Not built to Sell at a Price, the construction of the Envoy merits the approval of the U. S. Navy

Ample payload permits such extras as controllable pitch propeller, parachutes, etc., without eliminating a passenger. Standard equipment includes steel propeller, engine-driven generator, electric starter, radio, electrically-operated flaps, 90 gals. gas capacity.

KINNER AIRPLANE AND MOTOR CORP., LTD., Glendale, Calif.





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Shell Petroleum CorporationCharles F. Miller
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The Roll Call of an Industry



The Aviation Departments of the major oil companies are headed by men of wide experience with aircraft. It is significant that so many of these Veterans of the Air have selected a Stinson 'Reliant' when there is need for the utmost in economy and reliability.

To all who are interested in the airplane as a business utility, we will be glad to mail a Brochure on the subject.

**WORLD'S LARGEST
BUILDERS OF
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Business Executives who have need for fast transportation by day and night have looked orders for this latest Stinson Airliner, fastest of all trimotors, and deliveries are being made this spring.

Built for those who demand the utmost in safety, comfort and economy, this Airliner, powered with three proven Lycoming motors, provides speedy trimotored transportation heretofore unobtainable at reasonable cost.

Ask for specifications.



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FORMICA



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AIR LINER**



• **THESE** handsome new ships have a quieter and more attractive cabin through the use of Formica on the interior. The ceiling is covered with decorative Formica sheet which has been perforated and provided with a loose fibre backing to deaden noise. There is a Formica waistcoat up to the level of the bottom of the windows which is handsome, easy to clean, and

which will stand up to very hard use. • The control pulleys also are Formica. • A very large percentage of the new aeroplanes going into use employ some Formica.

Let us give the facts about the use of Formica sheet on cabin interiors.

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GOES SHERWIN-WILLIAMS!

Nicholas Beazley Airplane Co., with main offices at Marshall, Mo., and branches at Glendale, Calif., and Royal Bennett Field, Brooklyn, N. Y., recently became distributors for the complete line of Sherwin-Williams Aero Finishes. To its customers they well known firm says: "...You will be pleased with the results obtained from the use of these high-grade products."

Sherwin-Williams Aero Finishes include the right

material for every type of aircraft surface—dopes, thinners, Opex, Gacquer, Enamels, Clear Aliding Lacquers, Airplane Sprays, Varnishes, Rust Removers, Polishing Compound, Lacquer Remover, Bird Chaser, Metal Primers, Engine Enamels, etc. They are the best finishes for airplanes that insure longevity, backed by the resources of the world's largest manufacturer of finishing products, can produce

Write for this Free Book—"Airplane Finishing Specifications"

"Sherwin-Williams Airplane Finishing Specifications" is an essential finishing guide. It contains complete information on finishing airplanes, methods and systems. Includes material cuts up to 1/4" color in 48 Finishing Steps and Aero Glosses. Includes data on fabric and metal finishing.

Appearance costs and speeds for common airplane finishing troubles. This and other information is based on standard experiments and experience plus the value practical treatment by airplane manufacturers. Write The Sherwin-Williams Co., Cleveland, Ohio, for



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SHERWIN-WILLIAMS PAINTS



R. P. IOHN

作者单位: 1. 湖南大学, 湖南长沙 410082; 2. 湖南大学, 湖南长沙 410082

B. F. Johns oversees a log to a living room pine, all within one organization. This leading West Coast furniture manufacturer believes in complete control from one material to finished furniture. When purchasing forests for wood production, they expect the supplier of these forests to subject every ounce of material to their exacting standards.

That is, it is what B. F. John, research director at Sherwin-Williams, adds, that because this high-grade furniture manufacturing concern purchases 100% of its finishing materials from its Parkersburg, IA, sales force (because the fact that B. F. John and Sherwin-Williams' leaders, standing side-by-side, is a powerful statement of corporate unity). This also emphasizes its direct connection to the main value of finest quality finishes, backed by the solid appearance of the Sherwin-Williams research and technical organizations. This close cooperation has also led to extreme productivity increases—improved production schedules, less waste, and a reduction in finishing materials, which also leads to less waste in an ecological budget.

**FREEMAN SHOE
COMPANY**

BIOLOGICAL WEAPON DEFENSE

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MARTZ BUS

SPRINGDALE, PA.

A free operating estimate of the Great
Meyer-Couch Co., largest independent in-
surer in America.

Factor Cars	110
City Type Buses	55
Cost Trucks	20
Mileage (1954)	3,000,000
Passenger (1954)	4,000,000
Operation Hours (1954)	304,000

This means service, most service, and all more rough, rough street. More and

Shawnee-Williams Open Lacrosse and other summer sports for every child in the garage. These coaches prove that parents can't win, snow, dust, dirt, rain, heat—and prove it by showing longer kids and level collecting jobs. Shawnee-Williams registers are growing up and out from happen to happen, up to meet

**KOOL
CIGARETTES**

ATLANTIC CITY

The Kool Program came along through the 80's above the boardwalk in Atlantic City—where theatrical alligators were conserved against the black of the night. To make this country to grant to people. S.W. Kool Bulletin. While it used to reflect the reliance of electric bulbs. Throughout the country, the brighter, more durable S.W. Kool Bulletin-Glass, because they made of bulbs of America's largest advertiser.

TOBACCO PLANTS

Condensate within a wharfed plane are more than enough to try the passage of any putal. Tobacco fumes have a high-molecular content that leads to specific yellowing on the part of more wall wharfed. And a rich high humidity is always necessary in the manufacturing process, and weather causes a maximum amount of condensation. At times, water actually runs in streams from windows onto window ledges and wall surfaces. Add to these the constant possibility of mildew and fungus, the impossibility of painting except in perfect weather, and you have a big painting headache.

Save Line, because of the wide experience of Shawnee Williams engineers, is an excellent behavior-industry paper. Here is a special industry where special formulations are necessary—where the mill where most is made is in the job. General Cigar Co., one of the largest exporters in the industry, manufactures on Save Line at the best price for all involved.

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TAYLOR, M. C.



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Starline's Williams-Payne serves the unique industry's special needs and assures the long life so necessary to law firms. One oversight: the fact that what applies to plant matters also applies to real estate property. Well-learned homes are in gear to leave months and longer work.

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MENASCO
AIRCRAFT ENGINES

Abstract



THE CHOICE OF THE ENGINE MANUFACTURERS

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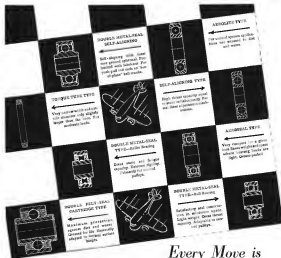
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Independent Supply

FAFNIR BALL BEARINGS

WACO PICKS GOODRICH FOR SAFETY!

EQUIPS LATEST 1933 MODELS WITH GOODRICH LOW PRESSURE TIRES



READ WHAT H. E. PERRY, SALES MANAGER, WACO AIRCRAFT COMPANY SAYS:

"Our selected supplier to use Goodrich Airplane Silvertowns because of careful construction, because all kinds of tires, from which, our experience has shown that Silvertowns were the most logical selection we could have made. We have the utmost confidence in their safety which is, of course, reflected in the fact that we equip all models with Airplane Silvertowns."

(Above) One of the new Waco 1933 Canton Cubes Series.

(Right) The new Waco 1933 Standard Cubes Series. For extra safety price up and coming down, all 1933 models are equipped with Goodrich Airplane Silvertowns.



(Above) The new Waco Model F6 has plenty of appeal for the sportsman pilot.



Waco is already taking its 1933 stride! With new designs. New performance.

Yet—note this. All Waco models continue to have Goodrich Airplane Silvertowns on the wheels. This selection of the new five-year after year—can only mean that Airplane Silvertowns have "stood up." Even if spenders are higher—even if changes are made in design. Waco engineers know that Goodrich Low Pressure Tires can be depended on for safe landings and take-offs.

EXTRA STRENGTH

Goodrich Airplane Silvertowns

have the steady toughness that can absorb sudden impact from rocky fields. Extra large "ground contact" areas smother bumps and bumps, land planes in a jumble, bumpless stop. If you want a tire that can last your plane hundreds of times and still hold up—still be economical, get Goodrich Airplane Silvertowns. Why delay? See your nearest Goodrich dealer, or write Dept. 693, Aeronautical Division of The B. F. Goodrich Co., Akron, Ohio, for complete information about Goodrich Airplane Silvertowns and 48 other Goodrich rubber products for airplanes.

Goodrich Airplane Silvertowns

THE SAFEST AIRPLANE TIRE EVER BUILT

Over 40 Safety Factors for Airplanes—Including Tires—Tuf Wheels—Aircraft Shoes—De Ions—Mating—Elastic Feet—Guarantee—Black Abrasive Cord—A Complete Line of Safety Aeronautical Accessories.



Editor-in-Chief
GEORGE B. HAVEN
in charge of Textile
Research, Massachusetts
Institute of Technology.



New... Just off the Press... Handbook of Industrial Fabrics

Published by Wellington Sears Company

Contains Result of Test on Grade A—Aeronautical Fabrics

The new handbook includes on pages 345 to 354 the results of a comprehensive comparative test made upon the leading Grade A Aeronautical Fabrics.

One complimentary copy of the handbook will be sent free to any Aeronautical organization in the United States having satisfactory financial rating, upon request of one of their Executives, who writes on his business stationery and who indicates his position. Additional copies may be had at the price of \$2.00 each.

Wellington Sears Company is the representative for extensive large scale making of 15,000 different custom fabrics and is especially well known in the Aviation industry as the originator and distributor of BA-30 Fabric.

BA-30 Balloon and Aeroplane

was originally designed over two years ago as an improvement over the then existing fabric available. A self-imposed weight maximum of 4 ounces in the square yard has been adhered to since the beginning. Furthermore the elimination of any stretch or sag was accomplished. In BA-30 Fabric you get all cotton.

It, therefore, comes to no surprise to us that both the Army Air Corps and the Navy have approved it their respective own Specifications for Grade A Fabric a weight maximum of 4 ounces and a size content not to exceed 1 percent.

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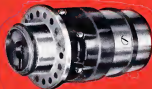
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